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# Monitoring Plans: Soup to Nuts

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## Monitoring Plans (Part 75, Subpart H)

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- ◆ A monitoring plan (MP) is required for each affected unit under the NO<sub>x</sub> SIP Call or Section 126 trading program
- ◆ The monitoring plan has both a hardcopy and an electronic portion (§75.53)



# Hardcopy MP Elements

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- ◆ Test protocols
- ◆ Span and Range calculations
- ◆ Calibration gas levels (% of span)
- ◆ Schematic and engineering drawings
- ◆ Data flow diagram
- ◆ Apportionment strategies
- ◆ Miscellaneous technical justifications



# Electronic Monitoring Plans

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- ◆ Electronic monitoring plan information is reported to EPA in a special “Electronic Data Reporting” (EDR) format
- ◆ The “500-level” EDR records are used to report the monitoring plan data



## Electronic Monitoring Plans (cont.)

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- ◆ EDR version 2.1 required for Subpart H
- ◆ EDR record types (RTs) and instructions are found in “Electronic Data Reporting Version 2.1 Instructions”, January 24, 2001
- ◆ EDR Instructions available on website:  
[www.epa.gov/airmarkets/reporting/edr21](http://www.epa.gov/airmarkets/reporting/edr21)



## Electronic Monitoring Plans (cont.)

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- ◆ EPA has developed “Monitoring Data Checking” (MDC) software, which can be used to create an electronic monitoring plan
- ◆ The EDR Instructions are accessible through the “Help” function of MDC
- ◆ MDC software is available at:

[www.epa.gov/airmarkets/monitoring/mdc](http://www.epa.gov/airmarkets/monitoring/mdc)



# EDR Submittals (Introduction)

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- ◆ Each record type in an EDR submittal must be formatted properly
  - Each data element has a “start column” and is limited to a certain length
  - Entries in alphanumeric data fields must be left-justified
  - Entries in numeric fields must be right-justified
  - Many numeric fields have a fixed decimal point location



## EDR Submittals (Introduction) - cont.

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- ◆ All record types must be in proper sequence in each EDR submittal
- ◆ Some EDR records are submitted only at the unit level, under the unit ID
- ◆ Other record types are submitted under a common stack or multiple stack ID number (if those monitoring configurations are used)





EXAMPLE RECORD STRUCTURE FOR RECORD TYPE 320

UNIT DATA								
RECORD TYPE	TYPE CODE	START COL	DATA ELEMENT DESCRIPTION	UNIT ID NOTES	UNITS	RANGE	LENGTH	FORMAT (FIN)
NOx EMISSIONS DATA								
NOx Emission Rate Data	320	1	Record type code				3	I3
		4	Unit/Stack ID				6	A6
		10	Monitoring system ID				3	A3
		13	Date		YYMMDD		6	I6
		19	Hour		HH	00-23	2	I2
		21	Percent monitor data availability for NO <sub>x</sub> emission rate calculations		%	0.0-100.0	5	F5.1
		26	F-factor converting NO <sub>x</sub> concentrations to emission rates				10	F10.1
		36	Average NO <sub>x</sub> emission rate for the hour		lb/mmBtu		6	F6.3
		42	Adjusted average NO <sub>x</sub> emission rate for the hour		lb/mmBtu		6	F6.3
		48	Operating load range corresponding to gross load for the hour			01-10	2	I2
		50	Formula ID from monitoring plan for hourly NO <sub>x</sub> emission rate				3	A3
		53	Method of determination code <sup>5</sup>			01-12, 14, 21, 25, 54, 55	2	I2
Total Record Length							54	



**COLUMN POSITION**

1	4	10	13	19	21	26	36	42	48	50	53
3	2	1	3	2	2	1	4	2	2	3	1
3	2	1	3	2	2	1	4	2	2	3	1
Type Code	Unit/Stack ID	Monitoring System ID	Date	Hour	Percent Availability	F-factor	NOx Emission Rate for Hour	Adjusted NOx Emission Rate for Hour	Load Range	Formula ID	Method of Determination Code
320**1	A1099050100			100	98.5		1800	0.331	0.331	07N0101	



# Creating an Electronic Monitoring Plan

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- ◆ There are 4 basic types of information in an Electronic Monitoring Plan:
  - FACILITY INFORMATION
  - UNIT INFORMATION
  - STACK or PIPE HEADER INFORMATION
  - MONITORING INFORMATION



## Facility Information (EDR Record Types)

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- ◆ Each electronic monitoring plan must include Facility Information. There are 2 essential EDR Record Types:
  - Facility identification (RT 100)
  - Facility location and identification information (RT 102)



## Facility Identification (RT 100)

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- ◆ RT 100 identifies the facility (plant) represented by the data in the file, using the ORIS Code
- ◆ RT 100 also indicates the quarter and year of the EDR submittal and gives the EDR version number
- ◆ This record must be the first record in every EDR submittal
- ◆ Report one RT 100 for each facility



## Facility Location and Identification Information (RT102)

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- ◆ RT 102 gives the plant name, location (e.g., latitude, longitude), and various ID numbers and codes (e.g., SIC code, AIRS ID, etc.)
- ◆ Include only one RT 102 for a facility in each EDR submittal



## Unit Information (EDR Record Types)

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- ◆ The electronic monitoring plan must contain specific information on the affected unit(s). The important EDR Record Types are:
  - Unit Information (RT 504)
  - Program Indicator (RT 505)
  - EIA Cross-Reference Information (RT 506)



## Unit Information (EDR Record Types) - cont.

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- ◆ Important EDR Record Types (cont.):
  - Peaking Unit Qualification (RT 507)
  - Monitoring Methodology (RT 585)
  - Emission Controls (RT 586)
  - Fuels (RT 587)





## Unit Information (RT 504)

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- ◆ RT 504 gives the unit type, max hourly heat input capacity, first date of operation, stack height and cross-sectional area
- ◆ Provide one RT 504 for each unit in the file



## Program Indicator (RT 505)

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- ◆ RT 505 indicates the applicable program(s) for which the EDR is being submitted
- ◆ You must report RT 505 for each unit represented in the file
- ◆ Submit one RT 505 for each applicable program
- ◆ Note: The 3 most important program codes are:
  - » “**ARP**”---for Acid Rain Program units
  - » “**SUBH**”---for NO<sub>x</sub> SIP Call and Section 126 units
  - » “**OTC-SUBH**”---for an OTC unit transitioning to the NO<sub>x</sub> SIP Call or Section 126 program



# EIA Cross-Reference Information (RT 506)

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- ◆ RT 506 provides cross-references between the ID of each Part 75 monitored location (e.g., unit, common stack or multiple-stack) in EPA's database and the corresponding unit and stack ID numbers in EIA's database
- ◆ Report RT 506 for each Part 75 location at which emissions are monitored



# Peaking Unit Qualification (RT 507)

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- ◆ RT 507 documents the capacity factor of a unit for the last 3 years (or ozone seasons), to show that the unit qualifies as a peaking unit
- ◆ You must submit RT 507 if you elect to use Appendix E to estimate NO<sub>x</sub> emission rate
- ◆ You may submit RT 507 for non-Appendix E peaking units, to claim certain exemptions (e.g., flow monitors on peaking units are exempted from multiple-load flow RATAs)



## Monitoring Methodology (RT 585)

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- ◆ RT 585 defines the general monitoring approaches used to measure or estimate emissions and heat input -- Examples:
  - CEMS for NO<sub>x</sub> emission rate and heat input rate
  - NO<sub>x</sub> concentration times stack flow rate for NO<sub>x</sub> mass
  - Appendix E for NO<sub>x</sub> emission rate and fuel flow metering for heat input rate
- ◆ If use more than one methodology for a parameter (e.g., as a backup), submit multiple RTs 585



## Monitoring Methodology (RT 585) - cont.

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- ◆ If the monitoring methodologies for Subpart H and the Acid Rain Program are identical for a particular parameter, duplicative reporting of RT 585 is not required



## Emission Controls (RT 586)

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- ◆ RT 586 defines types of emission control equipment installed for each unit
- ◆ If a common stack serving two units contains a control device, report this information for each of the units associated with the common stack



## Emission Controls (RT 586)

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- ◆ Do not report RT 586 for an uncontrolled unit or for a unit that controls emissions by limiting production or by switching fuels
- ◆ Submit multiple RTs 586 when:
  - More than one parameter is controlled (e.g., SO<sub>2</sub>, NO<sub>x</sub>, particulate); and/or
  - More than one type of controls are installed for a parameter (e.g., steam injection and SCR for NO<sub>x</sub>)





## Fuels (RT 587)

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- ◆ RT 587 indicates each type of fuel burned at the unit and whether the fuel is used as a primary, secondary, startup or emergency fuel

# Stack or Pipe Header Information (RT 503)

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- ◆ RT 503 is required only if you:
  - Measure emissions at a location shared by more than one unit (e.g., common stack or pipe) or
  - Measure emissions from a unit at more than one location (e.g., multiple stacks or ducts)
- ◆ For a common stack, RT 503 links each unit to the stack
- ◆ For a unit with a multiple-stack configuration, RT 503 links each stack to the unit



# Monitoring Information (EDR Record Types)

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- ◆ The electronic monitoring plan must contain specific information on the way in which emissions and heat input are monitored. The important EDR Record Types are:
  - Monitoring System Information (RT 510)
  - Emission Equations (RT 520)
  - Span and Range Information (RT 530)



## Monitoring Information (EDR Record Types) - cont.

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- ◆ Important EDR Record Types (cont.):
  - Maximums, Minimums, Defaults (RT 531)
  - Unit Load Information (RT 535)
  - Range of Operation and Normal Load (RT 536)
  - Fuel Flowmeter Information (RT 540)
  - Appendix E Correlation Curves (RT 560)



# Monitoring System Information (RT 510)

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- ◆ Use RT 510 to represent all of the monitoring systems used to measure emissions and heat input
- ◆ For CEMS-based methodologies, a monitoring system is required for each parameter monitored (e.g., NO<sub>x</sub> emission rate, stack flow rate)
- ◆ For CEMS, the monitoring system consists of the analytical component(s) and the DAHS software. Probes, data loggers and PLCs may also be included in the system



## Monitoring System Information (RT 510) - cont.

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- ◆ For monitoring methodologies based on fuel flow metering (e.g., Appendix D for SO<sub>2</sub>), the monitoring system in RT 510 consists of the fuel flowmeter component(s) and the DAHS software component(s)
- ◆ The RT 510 NO<sub>x</sub> monitoring system for an Appendix E unit consists of only the DAHS software component



## Emission Equations (RT 520)

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- ◆ Use RT 520 to represent the formulas that are used to calculate required emission rates, heat input rates, etc. from the primary monitoring systems defined in RT 510
- ◆ For CEMS-based methodologies under Subpart H, you need formulas for some or all of the following:
  - $\text{NO}_x$  emission rate
  - $\text{NO}_x$  mass emissions
  - Heat input rate



# Emission Equations (RT 520) - cont.

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- ◆ Formulas for CEMS-based Methodologies (cont.):
  - F-factor proration calculation for mixed fuels
  - Flow-weighted or heat input-weighted  $\text{NO}_x$  emission rate formulas for multiple stacks using two primary  $\text{NO}_x$  systems
  - Moisture formulas for moisture systems using  $\text{O}_2$  wet and dry readings
  - Flow rate formulas for stack flow systems consisting of two or more flow monitors





## Emission Equations (RT 520) - cont.

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- ◆ For Fuel Flow-based methodologies you will need formulas for some or all of the following:
  - Heat input rate
  - Net fuel flow formulas for systems with more than one flowmeter
  - F-factor proration for mixed fuels



# Span and Range Information (RT 530)

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- ◆ RT 530 provides information on the span(s) and range(s) of all monitors and the effective date(s) of the span and range values
- ◆ For CEMS-based monitoring methodologies, you must report RT 530 for each parameter that is monitored (e.g., NO<sub>x</sub>, CO<sub>2</sub>, O<sub>2</sub>, flow rate)
- ◆ If NO<sub>x</sub>, CO<sub>2</sub>, or O<sub>2</sub> emissions vary such that dual ranges are required, provide separate RTs 530 for low-scale and high-scale span and range values



## Span and Range Information (RT 530) - cont.

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- ◆ For peaking units using Appendix E, RT 530 must also be submitted, to define the maximum potential NO<sub>x</sub> emission rate (MER) for missing data purposes

# Maximums, Minimums, Defaults, and Constants (RT 531)

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- ◆ If your monitoring methodology includes one or more special constants or default values, define these in RT 531
- ◆ Examples of defaults that must be reported in RT 531 include:
  - “Diluent Cap” values (used to calculate  $\text{NO}_x$  emission rate or heat input rate), based on the unit type and the diluent gas ( $\text{CO}_2$  or  $\text{O}_2$ ) monitored
  - Default moisture values used to estimate stack moisture content, for wood or coal-fired units



# Maximums, Minimums, Defaults, and Constants (RT 531) - cont.

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- ◆ Example RT 531 Defaults (cont.):
  - Generic or fuel-and unit-specific default NO<sub>x</sub> emission rates for qualifying low mass emissions (LME) units under section 75.19
  - Maximum rated hourly heat input rate (mmBtu/hr), for a qualifying low mass emissions unit
  - Maximum or minimum potential moisture percentage, for missing data purposes
  - Minimum potential O<sub>2</sub>, for missing data purposes



## Operating Load Data (RT 535)

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- ◆ Report RT 535 for each unit, stack, or pipe at which load-based missing data procedures are applied. This includes:
  - Units or stacks with NO<sub>x</sub> emission rate monitoring systems
  - Units or stacks with NO<sub>x</sub> concentration monitoring systems
  - Units or stacks with flow monitors
  - Units or pipes using fuel flowmeters for heat input determination



## Range of Operation, Normal Load, and Load Usage (RT 536)

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- ◆ RT 536 defines the upper and lower boundaries of the range of operation of a unit (or common stack), in terms of megawatts or steam load
- ◆ RT 536 also identifies the two most frequently-used load levels (low, mid or high) and defines the normal load level(s) for the unit
- ◆ The normal load designations are based on an analysis of historical load data
  - Date of the analysis is reported in RT 536



## Range of Operation, Normal Load, and Load Usage (RT 536) - cont.

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- ◆ RT 536 must be submitted in the quarterly report for each unit, multiple stack or common stack with installed CEMS
- ◆ For non-CEMS units with installed fuel flowmeters, RT 536 is required if the optional quarterly “fuel flow-to-load ratio” test in section 2.1.7 of Appendix D is being used to extend the deadline for the next flowmeter accuracy test





## Fuel Flowmeter Information (RT 540)

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- ◆ Report RT 540 for each fuel flowmeter system listed in RT 510
- ◆ RT 540 gives the maximum flow rate for the flowmeter and the method used to calibrate the meter

## Appendix E Correlation Curves (RT 560)

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- ◆ If you use Appendix E methodology to estimate hourly NO<sub>x</sub> emission rate, submit RT 560 in each quarterly report
- ◆ RT 560 describes the segments of the NO<sub>x</sub> Emission Rate vs. Heat Input Rate correlation curve, derived from 4-load emission testing
- ◆ If the unit burns oil and gas separately, a correlation curve is needed for each fuel

